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| (30) Priority:                                 | (71) Applicant: HITACHI LTD                   |
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**(54) METHOD AND APPARATUS FOR ETCHING**

(57) Abstract:

**PURPOSE:** To execute an etching operation which does not cause damage, whose anisotropy is high and which does not depend on whether a specimen is of a p-type or of an n-type by a method wherein a molecular flow of XeF<sub>2</sub> using H<sub>2</sub> as a carrier gas is used.

**CONSTITUTION:** A specimen 18 is etched by using a molecular flow of XeF<sub>2</sub> which uses H<sub>2</sub> as a carrier gas. When H<sub>2</sub> is used as the carrier gas, a translation energy of XeF<sub>2</sub> at 300K becomes 2.74 eV and exceeds an activation energy of 1.0±0.2 eV when a fluoride layer on the surface of Si is etched by using fluorine. Accordingly, the fluoride layer on the surface of Si can be removed; an etch rate can be enhanced; especially, the etch rate of p-type Si can be enhanced; as a result, a difference in the etch rate between p-type Si and n-type Si can be reduced. In addition, since an energy in molecules in the molecular flow is high as compared with molecules of a residual gas, an etching operation by the residual gas can be neglected and a drop in anisotropy is small. Thereby, it is possible to enhance the etch rate and the anisotropy as compared with conventional methods and to obtain the etch rate which does not depend on a p-type or an n-type.

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